

while heavier rain will be prevalent in the north-west. It will be interesting to compare this prediction with actual results; but at present we are more concerned to point out the care that is taken in preparing the forecast, the difficulty in the collection of exact data, and the manifold determination to make the best use of all available sources.

This scrupulous care is well illustrated in the second class of information incorporated into the weather prediction, and which rests on the abnormal features of the recent meteorology of India. To discuss these with any prospect of success, it is first necessary to determine correct normals. The work that this involves can only be appreciated by those who have been actually concerned in a similar inquiry, but it is a method of investigation into which Mr. Eliot and his predecessor, Mr. Blandford, have thrown themselves with signal success. The volumes of the Indian Meteorological Memoirs bear witness to the ability and zeal with which the work has been carried on throughout some twenty-five selected observatories. We may well express the hope that so much work is now yielding abundant fruit.

#### THE PRESENT POSITION OF THE INVESTIGATION OF THE MALARIAL PARASITE.

THE rôle played by the mosquito as a carrying agent of the malarial parasite from man to man seems to be restricted to one genus, the *Anopheles*. Major Ross, of the Liverpool School of Tropical Diseases, in a telegram from Sierra Leone, announces the fact that he has found the *Anopheles* there, and that it may be the intermediary host of the quartan malarial fever.

Many observers in different countries, noticing the fact that malaria is most prevalent at the most active period of mosquito life, have attributed malaria to the agency of this insect. Dr. Patrick Manson, in 1894, first brought the subject forward in England, and, acting on his suggestion and advice, Major Ross undertook an investigation in India.

In 1897, by using two species of *Anopheles*, Ross traced the malarial parasite into the wall of the stomach of the mosquito after it had fed on patients whose blood contained the crescentic gametocytes; the next year he succeeded in tracing the complete life-history of the proteosoma *Grassii* Labbé of sparrows, and showed that its intermediary host was one particular kind of mosquito, the *Culex pipiens*. The gametocytes contained in the red blood corpuscles of the vertebrate host pass with the blood into the stomach of the mosquito, and passing through the stomach-wall bulge into the body-cavity; here a sexual process takes place, zygotoblasts are eventually formed, which pass into the insects' blood, and finally find their way into the salivary gland and to the duct leading from this to the extremity of the stylet; from here they escape into the blood of the vertebrate host when the insect bites. A full account of the process is given by Ross in NATURE of August 3.

Following on these results, Grassi in Italy attacked the problem from another point of view; he studied the mosquitoes prevalent in the different parts of the country where malaria occurs. The results were interesting. He found there was no indigenous malaria where the *Culex pipiens* was common, but it did occur where the large mosquito *Anopheles* was found.

Bignami and Bastianelli, who had been trying unsuccessfully to infect a man by allowing mosquitoes to bite him, attributing their want of success to the use of the wrong kind of mosquito, and, acting on the observations of Grassi, tried again with some mosquitoes imported from a malarious district. This time they succeeded in infecting the man with malaria of the same type that prevailed in the district from which the mosquitoes came. More-

over, they have shown that the development of the human form of parasite in the body of *Anopheles* is identical with the development of the proteosoma of birds in *Culex pipiens*, as observed by Ross.

According to these observers, the species *Anopheles claviger* is the most common intermediary host of the parasite of malaria in Italy, the tertian and summer-autumn types.

It is evident that the next step in the study of malaria should be to hunt for the different species of *Anopheles* and see if these are the intermediary hosts of the different types of malaria throughout the world, and what particular species is most concerned in transferring the parasite from man to man. Grassi has done this for Italy, and now we hear that Ross has found a species of *Anopheles* to be concerned in the transference of quartan fever; thus all the types of malarial fever are now referred to the *Anopheles* as their intermediary host. His full report on return from Africa will be read with interest.

Whether the *Anopheles* can be extirpated from a locality, and by what means, will be the problem for scientific workers resident abroad to settle; fortunately they seem to be confined to small areas, so the suggestion of Ross to draw off the water from stagnant pools may not be so hopeless a task as it would at first appear.

#### NOTES.

THE following men of science have been elected fellows of the Reale Accademia dei Lincei. As ordinary fellows: for mathematics, P. Tardy, G. Veronese; for mechanical science, G. Favero, G. Colombo, V. Volterra; for agricultural science, A. Targioni-Tozzetti. As corresponding fellows: for mathematics, G. Ricci; for mechanics, G. A. Maggi; for physics, G. Grassi, A. Battelli; for crystallography and mineralogy, A. D'Achiardi; for botany, F. Delpino; for agriculture, A. Borzi; for pathology, E. Marchiafava. As foreign fellows: for mathematics, G. Mittag-Leffler, J. Weingarten; for physics, E. Mascart, W. Kohlrausch; for chemistry, Ludwig Mond, E. Fischer; for crystallography and mineralogy, C. Klein, F. Fouqué, F. Zirkel; for geology and palæontology, O. Torell, A. De Lapparent, R. Lepsius; for botany, W. Pfeffer; for zoology and morphology, E. Haeckel, E. van Beneden; for physiology, E. Pflüger, E. Hering.

THE Berlin correspondent of the *Times* reports that the Imperial Government has ordered Prof. Kossel, of the Board of Health, to proceed to Lisbon and Oporto to study the plague and the methods adopted to combat it. Prof. Kossel will be accompanied by Prof. Frosch, of the Berlin Institute, for the Study of Infectious Diseases, who is being despatched on the same mission by the Prussian Government. Drs. Calmette and Salinbeni are already investigating the outbreak, and will report upon it to the Paris Pasteur Institute.

PRINCE KROPOTKIN sends us a note which suggests that the movements of sea-gulls along the British coasts may indicate forthcoming weather changes. On Saturday, August 26, while off Broadstairs, he noticed several flocks of gulls flying along the coast towards Dover. The wind was then blowing from the north-east, as it had been doing throughout August, and there was little indication of a change; but an old fisherman remarked that the gulls which had stayed on the coast at Margate and to the west of it were moving to the south coast to meet a south-west wind, which was sure to come. As is known, the change occurred on the following day, and the wind veered round to the south-west. In connection with this observation, it is worth remark that Mr. Inwards, in his "Weather Lore," says: "The arrival of sea-gulls from the Solway Firth to Holywood, Dumfriesshire, is generally followed by a high wind and heavy rain from the south-west."

THE death is announced of M. Henri Lévêque de Vilmorin, first vice-president of the Paris Société d'Horticulture, and officer of the Legion of Honour.

THE tenth annual general meeting of the Institution of Mining Engineers will be held at Sheffield on September 19-21, under the presidency of Mr. J. A. Longden. Among the subjects of papers to be read or taken as read are:—Instantaneous outbursts of fire-damp and coal at Broad Oak Colliery, by Mr. John Gerrard; Castleton: history, geology, minerals and mining, by Mr. A. H. Stokes; the Peak Cavern, by the Rev. J. M. Mello; the mining districts near Kamloops Lake, British Columbia, by Mr. G. F. Monckton; the Devonian iron-ores of Asturias, Spain, by Mr. J. A. Jones; alternating currents and their possible applications to mining (Part i.), by Mr. Sydney F. Walker.

A TEACHER of science with a successful career before him has been lost by the death of Mr. O. G. Jones, who was killed in an accident on the Dent Blanche on August 30. Mr. Jones was appointed to the post of physics master in the City of London School in 1892, when a science side was being organised. He received his training at the Finsbury Technical College and at the Central Technical College, South Kensington, at both of which institutions he held scholarships. He was a B.Sc. of the University of London, where he took first class honours in physics. He possessed high qualities as a teacher, and his sad death will be much regretted.

THE New York *Nation* publishes a few particulars referring to the Danish northern-lights expedition which has just left Copenhagen for Iceland. The headquarters will be at Akureyri, a prettily situated little town on Iceland's northern coast. The expedition has been for several months under preparation, and its members have been carefully practised in the use of the instruments, all of the latest construction, which it carries with it. While the headquarters will remain at Akureyri, an auxiliary station will be established on a high hill not far away, and the two stations will be connected both by telephone and by an optical telegraph. The Director of the Danish Meteorological Office, Dr. Adam Paulsen, is at the head of the expedition. He will test his own published theories on the aurora, as well as others advanced by various investigators. Among the instruments to be used are photographic ones, and others of a novel character for the measurement of aerial electricity. Dr. La Cour and Dr. Jantzen are the two chief assistants to Dr. Paulsen, while Count Harold Moltke is attached to the party as its artist. The expedition will return in May 1900.

FROM Schwaz in Tirol to Gloggnitz in Lower Austria the southern boundary of the northern Dolomites and the central zone of the Eastern Alps is marked by a distinct depression, corresponding to a band of palæozoic schists, and evidently produced by denudation. This depression may have been a longitudinal valley, perhaps even in Tertiary times, but it is now drained by five channels which have been eroded across the whole of the northern Dolomites, the valleys of the Inn, the Lake Chiem Ache, the Saalach, the Salzach, and the Enns. In a short but valuable paper, contributed to the current number of the *Mittheilungen* of the Vienna Geographical Society, Prof. C. Diener discusses the relation of each of these valleys to the structure of the rocks through which it has been cut. He finds that in their present form all five are simply results of the erosive action of running water, and their position is practically independent of the complex tectonic structure of the region.

THE scientific aspects of the question of musical pitch were described in last week's *NATURE* by Mr. A. J. Hipkins. A book has now been published containing letters, articles, and comments which have appeared in the press with reference to

the proposal to adopt the low pitch throughout the pianoforte trade. The following agreement has been signed by the leaders of the pitch movement in the pianoforte trade:—"The vexed question of a suitable pitch for pianofortes should be settled, and believing that the time has arrived when it can be done effectually, we, the undersigned, after due deliberation, have decided to adopt the Paris diapason normal, but with the allowance for a higher temperature in orchestral performance, accepted since 1896 by the Philharmonic Society—namely, A 439 (C 522) at 68° Fahrenheit. From September 1, 1899, we intend to adopt this pitch as a standard for pianofortes both for retail and wholesale purposes, and will regard the late Philharmonic pitch A 454 (C 540) when required, as an exception, and not, as has been for many years in this country, the rule."

IN commemoration of the centenary of the discovery of the galvanic pile, and in connection with the International Exposition at Como, a statue of Volta has been erected on the Piazza Volta, by public subscription. The accompanying view



of this monument to the pioneer of electrical science is given in *La Nature*. Upon the pedestal of the statue the following words appear:—

OMAGGIO  
DEI TELEGRAFISTI  
D'OGNI NAZIONE  
NEL PRIMO CENTENARIO  
DELL' INVENZIONE  
DELLA PILA  
MDCCCXCIX.

As already announced, a National Electrical Congress will be held at Como, in connection with the Volta centenary celebra-



tions, on September 18-23. The congress is being organised by the Associazione Elettrotecnica Italiana and the Società Italiana di Fisica, and the leading foreign scientific authorities have been invited to attend.

THE report of the Director of the Botanical Survey of India, for the year 1898-99, shows that every advantage has been taken of the funds placed at the disposal of the survey for exploration in Burma, Assam and Bengal. A report by Mr. J. F. Duthie, Director of the Botanical Department of Northern India, states that the two parties of plant collectors who left Saharanpur in March 1898 to collect botanical specimens in the forest tracts of the Rohilkhand, Northern Oudh and Gorakhpur districts, collected between them about 1000 species; and also seeds of a large number of trees and shrubs for sowing in the Saharanpur Garden. The collections include several very interesting plants, for many of them had not been previously recorded for that part of India, whilst some had not been collected since they were originally discovered by Buchanan-Hamilton and others many years ago.

A BLUE-BOOK just issued, on the number of persons employed, and accidents in mines and quarries in the United Kingdom in 1898 contains several noteworthy points. During the year, 990 separate fatal accidents occurred in and about the mines and quarries, causing the loss of 1075 lives. Compared with the previous year, there was a decrease of twenty-five in the number of fatal accidents and a decrease of twenty-seven in the number of lives lost. When these numbers are considered in relation to the number of persons engaged in the mining industry, it is found that the death-rate in 1898 was the lowest hitherto recorded, viz. 1.28 per thousand as compared with 1.49 for the preceding five years. The improvement commenced in 1895, and has continued steadily down to the present time. It is pointed out that the use of naked lights—always the principal source of danger—is responsible for 147 out of the 163 explosions which occurred, and for sixteen of the twenty-seven deaths. In one of the worst explosions in 1898, it was conclusively proved that the explosion was one of coal-dust alone, and that it was caused by a shot of gunpowder illegally fired in a place which was very hot and dusty. As usual, gunpowder caused far more accidents than any other explosive, and nitro-glycerine compounds were responsible for more accidents than nitrate of ammonia compounds.

THE Physical Atlas which has been for about ten years in preparation at the Edinburgh Geographical Institute, under the direction of Mr. J. G. Bartholomew, will be the most comprehensive of its kind ever attempted. A draft prospectus just issued shows that the work will comprise seven volumes and more than two hundred plates. The subjects of these volumes will be geology; orography, hydrography, and oceanography; meteorology; botany; zoology; ethnography and demography; general cosmography and terrestrial magnetism. Berghaus's "Physikalischer Atlas" has been used as the basis of the undertaking; but the present work is much more extensive, and comprises entirely new and original material. Mr. Bartholomew's aim has been to produce a cartographic unification of natural science at the present time, and neither pains nor expense have been spared to make the Atlas a standard one to which men of science may turn with confidence. The meteorology section, with over 400 maps on thirty-four plates, will shortly be published.

AMONG the recent publications of the Deutsche Seewarte we would draw attention to a valuable discussion by Dr. W. Köppen, in vol. xxi. of *Aus dem Archiv*, upon recent determinations of the relation between wind velocity and Beaufort's wind-force scale (0-12). The relatively great expense of

anemometers, and the difficulty of obtaining a good exposure for them, are obstacles to their general use, while the employment of the Beaufort scale is necessarily continued at the great majority of observing stations, and at sea. It is therefore important to determine satisfactorily the relation between wind velocity and force. The first serious attempt at this determination was made by Mr. R. H. Scott, in 1875, and the values then obtained still appear in text-books and instructions, although it is now admitted that the instrumental factor 3, which had hitherto been generally used for the conversion of the anemometrical records into miles per hour, is considerably too high. Since that time experiments have been made, notably by Köppen, Sprung, Mohn, Dines, Curtis and others, the general result of which has been to show that the factor in question should be reduced to about 2.2. This result is confirmed by Dr. Köppen's recent investigation, and we understand that, as a result of his inquiries, anemometrical records in all the publications of the Seewarte will in future be reduced to real velocities by this smaller factor. We recommend the careful perusal of Dr. Köppen's paper to all meteorologists.

WE have received from the Secretary to the British Association Committee on Zoological and Botanical Publication a notice to the effect that at the Bristol meeting of the Association the committee was reappointed, with the Rev. T. R. R. Stebbing as chairman, in succession to the late Sir W. H. Flower, and with the addition of Messrs. B. D. Jackson and A. C. Seward as representatives of Botany. It is now proposed to deal with botanical publications; and it is believed that the principles and proposals of the 1897 report will apply with equal force to botanical papers. It is hoped that they may be interpreted in that spirit. It will be well to remind our readers that the recommendations are as follows, viz. :—(1) "That each part of a serial publication should have the date of actual publication, as near as may be, printed on the wrapper, and, when possible, on the last sheet sent to press. (2) That authors' separate copies should be issued with the original pagination and plate-numbers clearly indicated on each page and plate, and with a reference to the original place of publication. (3) That authors' separate copies should not be distributed privately before the paper has been published in the regular manner. (4) That it is desirable to express the subject of one's paper in its title, while keeping the title as concise as possible. (5) That new species should be properly diagnosed, and figured when possible. (6) That new names should not be proposed in irrelevant footnotes or anonymous paragraphs. (7) That references to previous publications should be made fully and correctly if possible, in accordance with one of the recognised sets of rules for quotation, such as that recently adopted by the French Zoological Society."

AN account of the electric welding of tram-rail joints in the city of Buffalo, U.S.A., is given in the *Electrical Review* of August 25. This process of rail welding has been greatly improved, and the results now obtained are seemingly all that can be desired. In Buffalo the bar used for welding is 1 x 3 x 8, and this joining of steel to steel, and the increased carrying capacity owing to the bars at the joints, results in a joint being a place of least resistance. The plant in operation for the purpose of welding consists of five cars. One of these is a sand-blast car which runs in advance of the welding car, and prepares the joint. The other cars are the welding car, the transformer car, the motor and booster car, and a car that follows in the rear to smooth any rough places about the joint. After the welding bars are placed over the joint the jaws of the welder are applied to them, and a pressure of about 1400 lbs. applied by means of a hydraulic jack connected to the upper

end. The current is then turned on, and the metal becomes brighter and brighter until the weld is completed, after which the current is turned off and the pressure increased to about thirty-five tons. While under this pressure the weld is allowed to cool, after which the car is moved back about six inches and the jaws applied to the other end of the bar, where the process is repeated. The other end is treated in the same manner. In other words, the centre weld is made first, and then the end welds. Artificial means of cooling are used, and as the bars cool they exert a powerful influence in bringing the rail ends close, so as to make a tight joint. The current for the operation of the plant is taken from the regular trolley wire service. It would be expected, from considerations of the action of heat upon metals, that rails welded in this way would buckle when they experienced a considerable rise of temperature, or snap when the temperature was very low, but, as a matter of fact, welded rails neither buckle nor break. By applying immense pressure to the material during welding, the length of a continuous rail made by this process is said to have no limit except that of the line itself.

DR. FRANZ BOAS has made a mathematical study (*American Anthropologist*, N.S., i. p. 448) of the biological significance of the cephalic index on the lines suggested by Mr. Francis Galton, and fully developed by Prof. Karl Pearson. His conclusion is that while the cephalic index is a convenient practical expression of the form of the head, it does not express any important anatomical relation. On the other hand, the relation between capacity and head diameters is found to be of fundamental importance, and among these the relation between the transverse diameter and capacity is most significant. Since in measurements on the living we are unable to measure capacity of the head, it is necessary to find a substitute. It would seem that circumferences are the most available means for judging cranial size. Therefore such circumferences should be included in all anthropometrical schedules designed to investigate racial characters.

FROM the Field Columbian Museum we have received Nos. 3 to 6 of the first volume of its "Geological Series" (Chicago, 1899). No. 3 treats of the ores of the South American Republic of Colombia, the specimens being described by Mr. H. W. Nichols, from a collection made by Señor F. Pereira Gamba. The ores were obtained from the mountainous western portion of Colombia, in which the Andes entering from the south divides into three chains known as the eastern, central and western Cordilleras. Gold was first mined by Europeans in Colombia in 1537, and during the sixteenth and seventeenth centuries the country was the great gold producer of the world; now it is said to rank ninth in importance. Iron ore is worked and smelted at Amaga. The authors observe that the gold and silver ores occur either in the acid lavas, which have been erupted at intervals from the close of the Tertiary period to the present time, or in adjacent Archæan schists. In the early days of mining, the superficial weathered rocks, which are the richest, were worked with signal success; the mines are now sunk below this zone. The ores are found in quartz as fissure-veins in the schists, and also as segregations from the surrounding lavas. In the latter case, they appear to have come to the surface in the lavas, from which they have to some extent been leached by hot solfataric waters and by tropical rains.

MESSRS. NEWTON AND CO. inform us that the whole of the lantern exhibitions at the forthcoming meeting of the British Association at Dover are to be carried out by them.

MESSRS. PHILIP HARRIS AND CO., Birmingham, have just published a diary which should be of service to science teachers. The diary covers the year from September 1, 1899, to August

31, 1900; and, in addition to the usual blank pages, contains seventy-six pages of tables and definitions frequently required in physical and chemical laboratories. The book is thus similar to an engineer's pocket-book, and its publication in the form of a diary will make it a constant companion of many science teachers.

MESSRS. R. FRIEDLÄNDER AND SON, Berlin, have issued in a single volume the numbers of *Naturae Novitates* published by them during 1898. It is well known to collectors of scientific books that Messrs. Friedländer's publication contains a useful classified list of current literature on all branches of science, compiled from catalogues in many languages. It is convenient to have these bibliographical lists in volume form, and a full index at the end increases their value.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albignularis*, ♂) from South Africa, presented by Mr. W. P. Peyton; a Common Camel (*Camelus dromedarius*, ♂) from Mogador, presented by Mr. F. G. Aflalo; a Stone Curlew (*Oedinenus scolopax*), European, presented by Mr. S. M. Sargent; a Common Raccoon (*Procyon lotor*) from Barbados, deposited.

ERRATA.—Lord Kelvin asks us to notify the following errata in the MS. of his letter on the "Blue Ray of Sunrise over Mont, Blanc," published last week (p. 411):—Line 1, for 5 o'clock read 4 o'clock; line 7, after "light" insert "of sunrise."

#### OUR ASTRONOMICAL COLUMN.

HOLMES' COMET 1899 d (1892 III.).—

*Ephemeris for 12h. Greenwich Mean Time.*

1899.	R.A.			Decl.			Br
	h.	m.	s.	°	'	"	
Sept. 7	2	6	50.14	+41	41	40.0	
8		7	15.57	41	55	35.8	
9		7	39.02	42	9	25.3	0.1814
10		8	0.45	42	23	8.0	0.05435
11		8	19.84	42	36	43.8	
12		8	37.16	42	50	12.4	
13		8	52.40	43	3	33.5	0.1795
14	2	9	5.51	+43	16	46.9	0.05538

During the week the comet passes through the north-west of Andromeda, being a few degrees west of  $\gamma$  Andromedæ on the 11th. It is in a good position for observation, but is reported as extremely faint.

In *Popular Astronomy* (vol. vii. pp. 340–342) Prof. C. D. Perrine describes the circumstances of his rediscovery of this comet on June 11 of the present year. The observation was made in the early morning with the 36-inch Lick refractor, the atmospheric conditions being very good. The comet appeared as a round nebulous mass about 30" in diameter, very faint and with but little central condensation. The orbit is more nearly circular than that of any other known comet, lying wholly between the orbits of Mars and Jupiter, thus suggesting a possible, but as yet unproved, connection with the asteroids also occupying that position.

THE NEW ALGOL VARIABLE IN CYGNUS.—The following are the predicted minima of this newly-discovered variable, which will admit of observation during September:—

	d.	h.	m.
1899, September	...	12	11 58 G.M.T.
		21	15 27

Mr. J. A. Parkhurst gives (*Popular Astronomy*, August 1899, vol. vii. p. 380) two charts of the stars in the neighbourhood, which will greatly facilitate the detection of the variable. Observations may be satisfactorily made with telescopes of 3 inches aperture. The position is about  $1^\circ$  south preceding the 5th mag. star  $\alpha^1$  Cygni.

HARVARD COLLEGE OBSERVATORY.—Prof. Pickering has recently issued the second part of vol. xxiv. of *Annals of Harvard College Observatory*, containing an exhaustive discus-